

REMARKS/ARGUMENTS

The application is a request-for-continued-examination of the original application numbered as 10/002,978, filed on December 6, 2001.

Rejection of Claims- 35 U.S.C. SECTION 103 (a)

The examiner has acknowledged that Claims 20-22, 24-25 and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hisatomi et al. in view of Dong et al and Cook. The examiner further states that Claims 23 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hisatomi et al. in view of Hosaka.

Applicant respectfully traverses the Office rejection. The claimed invention is nonobvious even if Hisatomi et al. discloses a semiconductor device including a silicon nitride film between two silicon oxide films by continuous steps.

A semiconductor device disclosed by Hisatomi et al. comprises a first and second CVD silicon oxide film containing more than 1×10^{18} Cl-atoms/cm³ and less than 2×10^{20} Cl-atoms/cm³, wherein a SiN film is formed between two CVD silicon oxide films, as disclosed in Claim 1. The semiconductor device manufactured by Hisatomi has an improved breakdown voltage because the breakdown voltage produced from influence of a substrate BMD, dopant, influence of grain of polysilicon and presence of dust could be reduced by the CVD silicon oxide films containing Cl that has concentration of more than 1×10^{18} atoms/cm³ and less than 2×10^{20} atoms/cm³, column 3 lines 42-57. The main objects of Hisatomi can be achieved by the semiconductor device

comprising the CVD silicon oxide films, containing Cl, formed on the silicon substrate, Cl of the CVD silicon oxide film having concentration of more than 1×10^{18} atoms/cm³ and less than 2×10^{20} atoms/cm³, as disclosed in the Summary. Thus the main objects of Hisatomi cannot be achieved if the semiconductor device comprising the CVD silicon oxide films does not contain Cl, as disclosed in the Summary, the detailed description of the preferred embodiments and claims of Hisatomi.

The method for forming an oxide-nitride-oxide structure in one chamber disclosed by Claims 20-28 of the claimed invention forms the oxide layers that do not include Cl. As recited in the Summary and Claims of the application of Hisatomi, the oxide layers including none of Cl cannot improve breakdown voltage according to the way that Hisatomi discloses.

As explained in MPEP 2143.01 □ Suggestion or Motivation to Modify the References. If the proposed modification would render the prior art invention being modified **unsatisfactory for its intended purpose**, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). The examiner states that the **Dong** reference discloses a method for forming the oxide film 16 includes no Cl using a different silicon precursor such as silane with an oxygen source. The examiner also states that **Cook** could form such an oxide film by using silane gas including no Cl and nitrogen gas. The examiner further states that the **Hosaka** reference discloses the method for forming a buffer layer (SiON)₄ by introducing silane including no Cl, nitrogen oxide, and ammonia. Thus, the examiner states that the claimed invention is obvious to one of ordinary skill in the art to use the oxide film formation by the silane and nitrous oxide teaching of Dong, Cook and Hosaka with Hisatomi method. However, replacement of forming the oxide-nitride-oxide structure of Hisatomi from dichloro silane to silane

including Cl would defeat the purpose of the oxide-nitride-oxide structure containing more than 1×10^{18} Cl-atoms/cm³ and less than 2×10^{20} Cl-atoms/cm³ to improve the breakdown voltage because the oxide-nitride-oxide structure formed by silane does not include any Cl. It is respectfully submitted that one of ordinary skill in the art could only have used hindsight to make the proposed modification. A rejection ignoring the purposes of the prior art in the manner that the ordinary artisan would have perceived them is improper. Applicant respectfully requests the reconsideration of the rejection from the examiner.

Moreover, the claimed invention is nonobvious over the Hisatomi reference. The efficiency of the method for forming the semiconductor device disclosed by applicant is much better than that disclosed by Hisatomi. The growing rate of SiH₂Cl₂ for forming the semiconductor device disclosed by Hisatomi is slower than the growing rate of SiH₄ for forming the semiconductor device disclosed by applicant. The growing rate of SiH₄ is about 15 times faster than the growing rate of SiH₂Cl₂. Besides, when using SiH₂Cl₂ as the material for forming the semiconductor structure, some side products, i.e. NH₄Cl or the others, will be formed to be particles to cause the defects of the semiconductor structure in the process.

Furthermore, it is so difficult and incredible to obtain a method for forming a semiconductor device by introducing gas including none of Cl, i.e. silane gas, from a method for forming a semiconductor device by introducing gas must include Cl, i.e. dichloro silane, as disclosed by Hisatomi. Therefore applicant respectfully submits that the claimed invention is nonobvious and requests reconsideration of the rejection from the examiner.

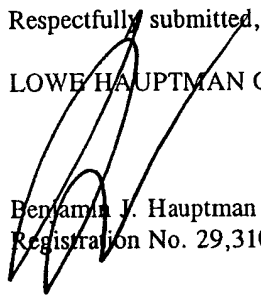
Conclusion

In light of the above remarks, applicant submits that Claims 20-28 as currently presented are in condition for allowance. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 07-1337 and please credit any excess fees to such deposit account.

Respectfully submitted,

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Date: October 10, 2003